APPENDIX A – MARKET MODEL ASSESSMENT

A.1 Model Evaluation

The F-test of all variables being simultaneously equal to zero was rejected for each of the four estimated equations (Table 5). The adjusted R-squares for the import supply and Canadian ex-vessel price indicate that these equations fit the data reasonably well. The adjusted R-squares for the import demand and U.S. ex-vessel price indicate that though the signs of the models are consistent with expectations these models are estimated with considerably more error perhaps due to some form of unaccounted for specification or measurement error. To further investigate the model properties the reduced form parameters for predicted import price, fresh whole Canadian import quantities, U.S. ex-vessel price, and Canadian ex-vessel price were estimated. Deviations between predicted and observed values were calculated by subtracting observed from predicted values. In this manner, a negative deviation means that the model-prediction exceeded the observed value. For positive deviations, the observed value exceeded the model-predicted value.

Import Price

Model-predicted import prices tend to be overestimates when observed import prices were below $1.00 (US) and underestimates when observed import prices were above $1.25 (Figure A1). Between these upper and lower bounds, there was no strong bias in either under- or overestimates of import price, although the model predictions overestimated prices at a higher rate (54%).

Observed import prices follow a distinct seasonal pattern, which is captured by the model. However, model performance varied over the time period. Specifically, from 1989 through 1991, when prices were lowest, the model tended to underestimate import prices (Figure A2). The standard deviation of the deviations from observed prices over this time period was twice as large as for the rest of the time series.

Figure A1. Deviations from Observed Import Price

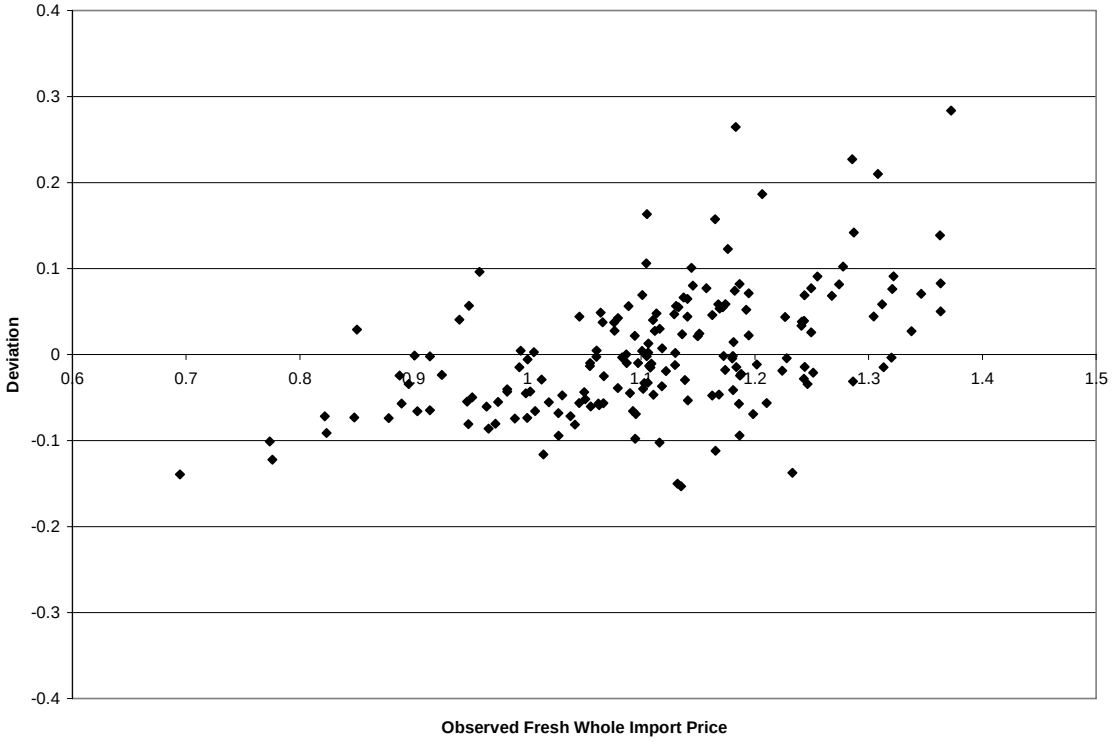
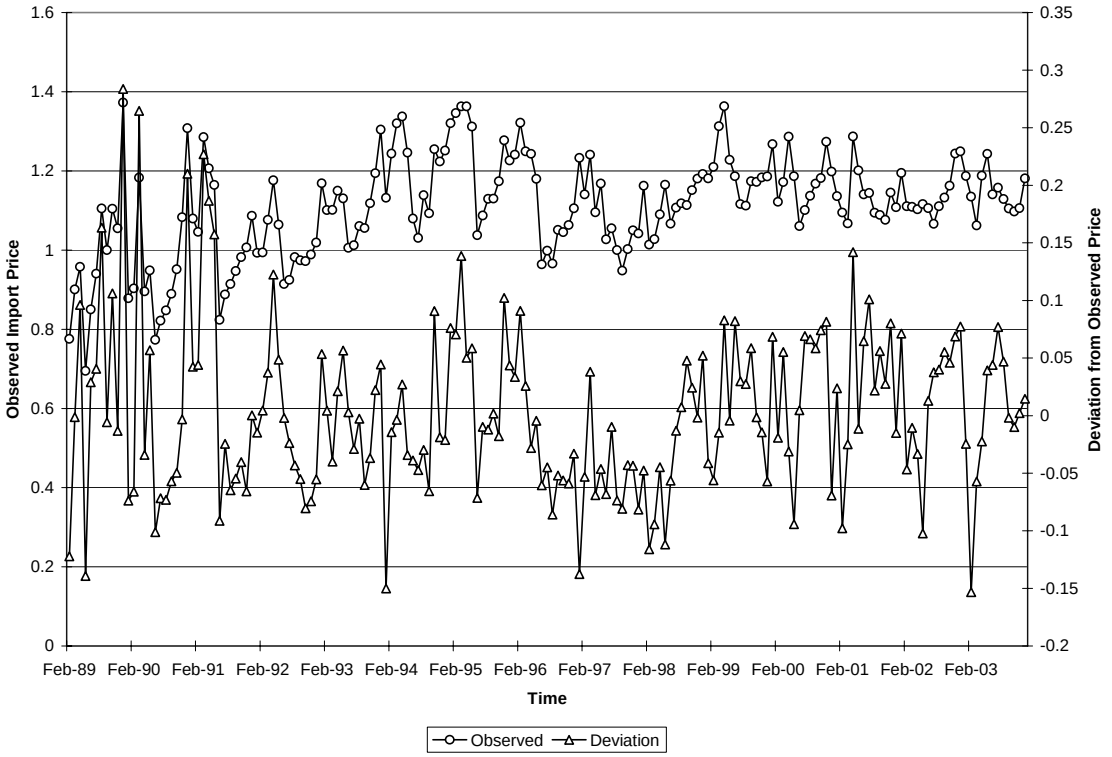


Figure A2. Time Series of Deviations from Observed Import Price



A second period of note is evident during calendar years 1996 through 1998. That is, the model-predicted import prices were consistently greater than observed prices. During calendar years 1992 through 1995 and from 1999 through 2003, import prices do not appear to be consistently under or overestimated

Model performance over the time series suggests that haddock markets have undergone some structural changes that have not been completely captured, although the model does appear to reasonably capture contemporary market conditions in import prices. Just how the model will perform as potential supplies of haddock increase is not, of course, known. Given known current and future abundance of haddock, increased supplies of haddock are probable and the import price is likely to go down. As noted above, the model tended to overestimate import prices when observed prices were low. This means that projected economic impacts could overstate realized impacts in the following manner. If import prices are overestimated, the Canadian ex-vessel price will also be overestimated because of the positive relationship between import price and ex-vessel price. Further, a higher import price would result in lower imported quantities that would, in turn, result in an overestimate of U.S. ex-vessel price because a reduction in import quantity will result in higher U.S. ex-vessel price.

Import Quantity

Deviations between observed values and predicted import quantities were larger (averaging almost 17% of the observed value) than deviations in import price (about 5% of observed prices) (Figure A3). This difference is to be expected since import demand is highly elastic. That is, import quantity responds proportionally more than a change in import price. Import quantity exhibits some of the same patterns over time as noted for import price (Figure A4). Note that the deviations follow a similar seasonal pattern as evident in the observed values. These seasonal peaks and valleys indicate that model predictions underestimate import quantities during observed peaks and overestimate import quantities during observed seasonal lows. Further, prediction error is greatest for these seasonal ups and downs and generally lower the rest of the year. This is because a fitted regression performs best at or near the average condition and is subject to greater error at the tails of the fitted data. For predictive purposes, this means that the model is likely to account for some of the seasonal nature of haddock markets, but the predicted seasonal highs and lows will be less pronounced than past observations.

Figure A3. Deviations from Observed Imported Quantities of Fresh Whole Haddock

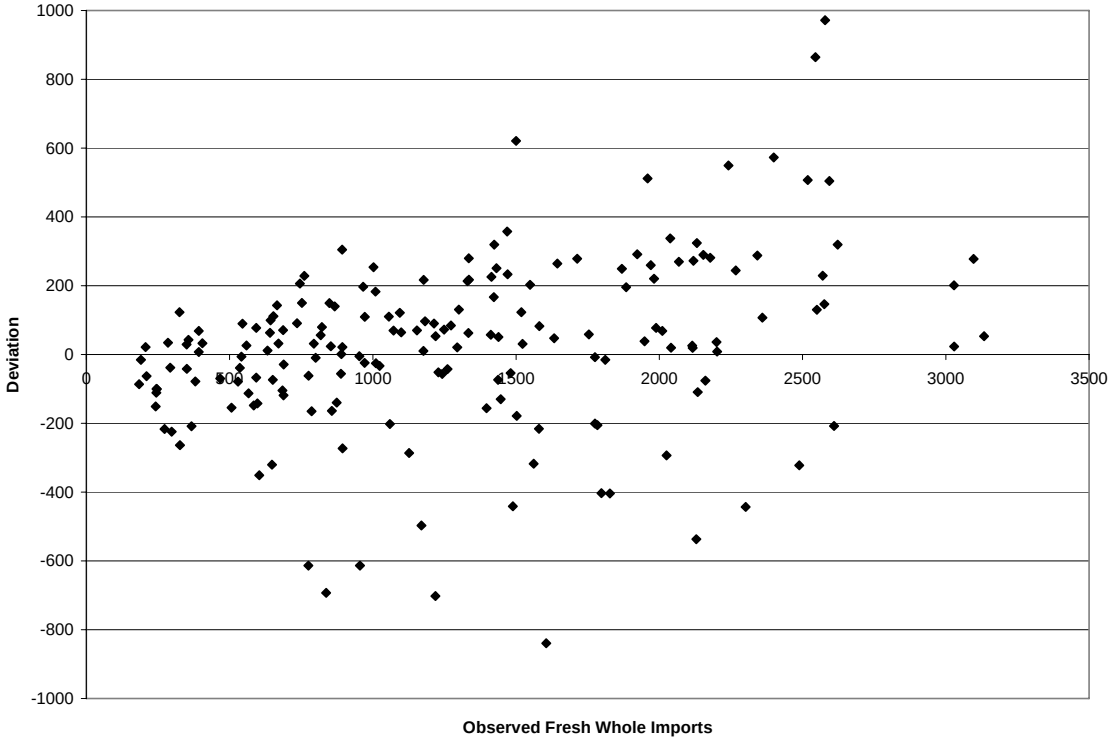
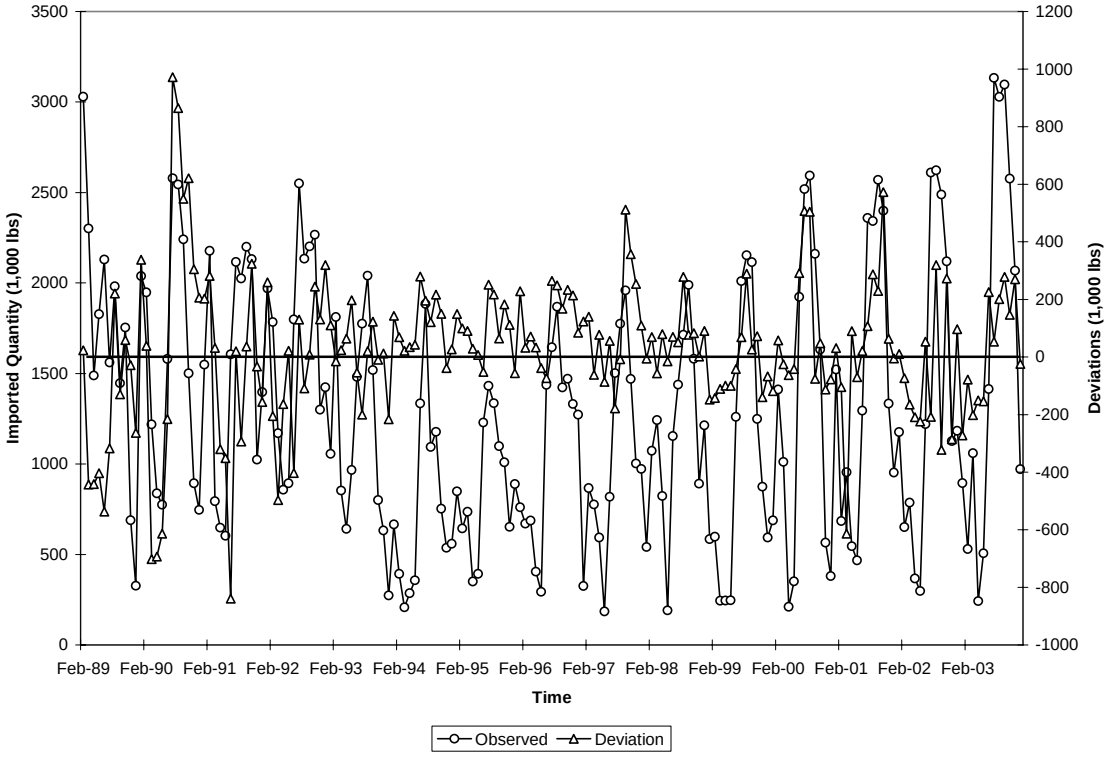


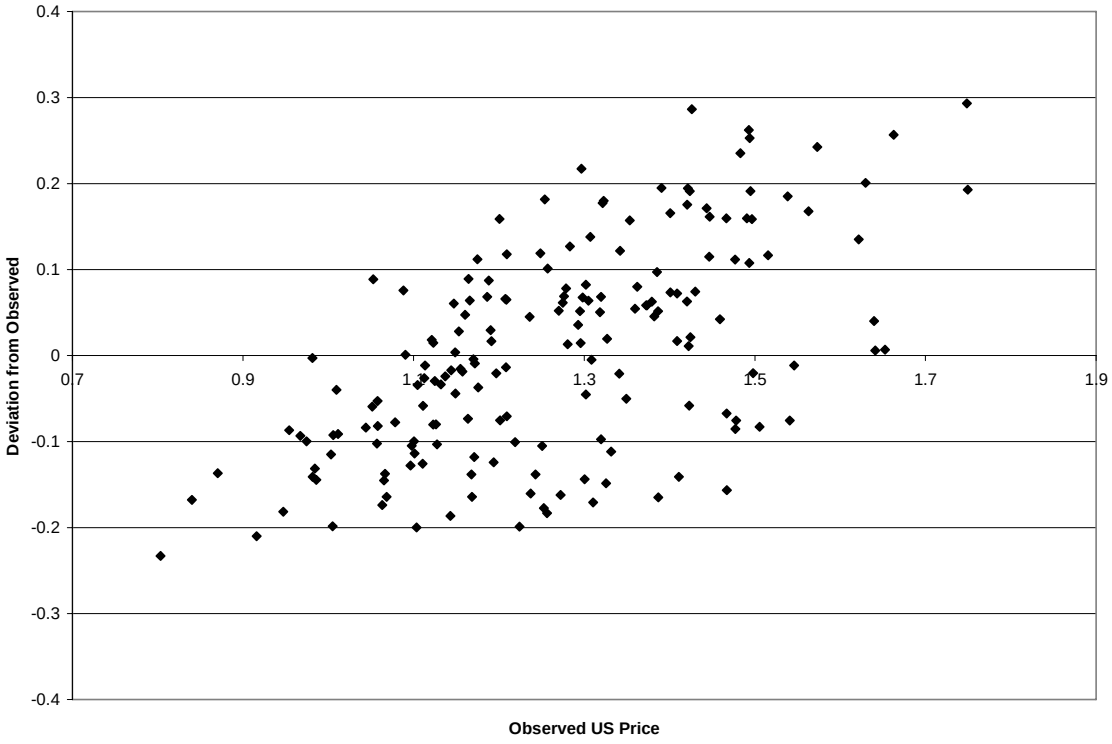
Figure A4. Time Series of Deviations from Imported Quantities of Fresh Whole Haddock



United States Ex-Vessel Price

The pattern of deviations between the predicted and observed ex-vessel price (Figure A5) in the United States is similar to that of the import price. Specifically, at lower observed ex-vessel prices (less than $0.95 per pound), the model consistently over-estimates price. The converse is true at higher prices. Overall, there was no systematic bias in terms of over- or underestimation of ex-vessel prices as half of the deviations were positive (price was underestimated) and the other half negative (price was overestimated). The average error was approximately 11% of the observed price.

Figure A5. Deviations from Observed U.S. Ex-Vessel Prices of Haddock



Canadian Ex-Vessel Price

The predicted Canadian ex-vessel price equation provided the best overall fit to the data as the R-square value was 0.75, and with few exceptions, the distribution of deviations ranged within plus or minus $0.10 (Figure A6). As was the case for the U.S. ex-vessel price equation, there was no systematic tendency to either underestimate or overestimate ex-vessel price in Canada. The average estimation error was approximately 6% of the observed price.

Figure A6. Deviations from Observed Canadian Ex-Vessel Prices of Haddock